

**The Past Revisited: Comparing and Contrasting
The Army After Next's Battle Force to the Pentomic Division**

**A Monograph By
Major Dale A. Jones
Ordnance Corps**

**School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas**

Second Term AY 98-99

Approved for Public Release; Distribution in Unlimited

DTIC QUALITY INSPECTED 2

19990804 058

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)

2. REPORT DATE

3. REPORT TYPE AND DATES COVERED
MONOGRAPH

4. TITLE AND SUBTITLE *The Past Revisited: Comparing and Contrasting the Army After Next's Battle Force to the Pentomic Division*

5. FUNDING NUMBERS

6. AUTHOR(S) *Max Dale A. Jones*

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
School of Advanced Military Studies
Command and General Staff College
Fort Leavenworth, Kansas 66027

8. PERFORMING ORGANIZATION
REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Command and General Staff College
Fort Leavenworth, Kansas 66027

10. SPONSORING / MONITORING
- AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION / AVAILABILITY STATEMENT

**APPROVED FOR PUBLIC RELEASE
DISTRIBUTION UNLIMITED.**

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)
SEE ATTACHED

14. SUBJECT TERMS *Army After Next Non-linear War
Pentomic Division
Future War*

15. NUMBER OF PAGES

58

16. PRICE CODE

17. SECURITY CLASSIFICATION
OF REPORT
UNCLASSIFIED

18. SECURITY CLASSIFICATION OF THIS
PAGE
UNCLASSIFIED

19. SECURITY CLASSIFICATION
OF ABSTRACT
UNCLASSIFIED

20. LIMITATION OF ABSTRACT
UNLIMITED

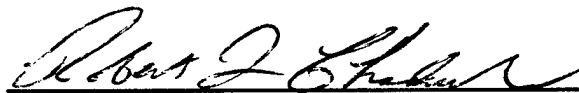
SCHOOL OF ADVANCED MILITARY STUDIES

MONOGRAPH APPROVAL

Major Dale A. Jones

Title of Monograph: *The Past Revisited: Comparing and Contrasting the Army After
Next's Battle Force to the Pentomic Division*

Approved by:



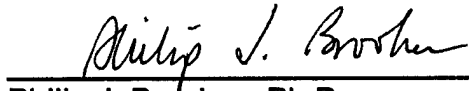
LTC Robert L. Chadwick, MS

Monograph Director



LTC Robin P. Swan, MMAS

Director, School of Advanced
Military Studies



Philip J. Brookes, Ph.D.

Director, Graduate Degree
Program

Accepted this 27th Day of May 1999

ABSTRACT

THE PAST REVISITED: COMPARING AND CONTRASTING THE ARMY AFTER NEXT'S BATTLE FORCE TO THE PENTOMIC DIVISION by MAJ Dale A. Jones, USA, 47 pages.

The United States Army is currently evolving from its Cold War structure to the more force-projection-oriented army of Force XXI. This transition will be complete by 2010. Beyond Force XXI is the Army After Next (AAN) which is projected to be implemented between 2020 and 2025.

The Pentomic Division of the 1950s and the AAN Battle Force concepts appear to have many similarities between them. These similarities include, but are not limited to, non-linear style operations, dependence upon air lines of communications, "island" support concept, ultra reliable vehicles, battle rhythm and reliance upon new technology to support the concept. Both of these concepts tried/try to leverage technology to drive the concept to fruition.

With the ultimate failure of the Pentomic Division's ability to conduct continuous combat operations it becomes relevant to compare the two concepts to determine if there are any substantial differences between them which will enhance the AANs probability of success. If there are not any discernable differences between the AAN and Pentomic concepts, is the Army headed down the same path forty years later?

The AAN and Pentomic concepts are critically compared against one another using the five basic Tenets of Army Operations of initiative, agility, depth, synchronization and versatility contained in Army Field Manual 100-5, dated 14 June 1993. These concepts are compared to determine which one is most compatible with these tenets. These tenets are recognized Army wide as the keystones to any operation.

Analysis reveals that the AAN Battle Force concept better supports the five tenets than the Pentomic Division concept. This monograph comes to three basic conclusions as to why the AAN Battle force concept better supports the tenets. First, the AAN concept has an inherent advantage in the time span of development. Second, the political and social environment has changed significantly since the 1950s and is more conducive to the AAN concept. Third, the design of the AAN concept is more complete and relevant as a warfighting concept.

TABLE OF CONTENTS

Relevance of Study: The Pentomic Division and the Army After Next Concepts	2
Problem Statement	6
Research Question	7
Selection Criteria	8
Criteria Explained	9
Importance of Criteria	14
Criteria Analyzed	14
Summary of Findings	42
Principle Conclusions	43
Recommendations	47
Endnotes	49
Bibliography	56

RELEVANCE OF STUDY: THE PENTOMIC DIVISION AND ARMY AFTER NEXT CONCEPTS

With the United States Army looking into the 21st Century and beginning the development of the Army After Next (AAN) Battle Force (BF) one must take the time to reflect upon past attempts by the Army to capitalize upon leap-ahead technology. The Pentomic Division provides a good comparison to the AAN BF because the Pentomic Division concept also sought to utilize leap ahead technology of the late 1950's to conduct operations on the nuclear battlefield. Like today's Army trying to utilize its information technology dominance in the development of the AAN, so too did the Army of the 1950s attempt to exploit America's dominance in nuclear weapons. Thus the parallels between the two concepts can be drawn.

The Pentomic Division attempted to capitalize on tactical nuclear fires to make up for the imbalance of forces facing the United States in Europe from the Soviet Union.¹ The very idea of the employment of nuclear fires in a tactical battlefield environment was not just the Army's. This concept was seen as supporting the United States Strategic strategy of Massive Retaliation.² The Army itself did not come up with the tactical nuclear fires concept. Many noted scholars of the day supported this new theory of warfare. The most notable of these was Henry Kissinger. Additionally, a study by the California Institute of Technology, Project Vista, also supported the theory of tactical nuclear fires.³

The key characteristics of the nuclear battlefield the Pentomic Division sought to deal with were dispersion, mobility, autonomy and flexibility.⁴ It was felt that the division must be capable of dispersion so as to avoid becoming a lucrative target for a nuclear strike. Tactical mobility was required so the division could concentrate (i.e.

mass) at decisive points on the battlefield and also to disperse again after decisive actions were complete. Strategic mobility was sought because of the no notice Korean War which illustrated the need for the Pentomic Division to be capable of deploying anywhere in the world on a short/no notice basis. The dispersed the division components were to be autonomous. In other words, large enough to conduct independent decentralized operations for independent actions for a period of time but small enough not to become a lucrative nuclear target. Lastly, the Pentomic Division needed to be flexible enough to deal with the broad spectrum of conflict, not just nuclear conflict. This included limited conventional wars and operations other than war.⁵

Decentralized operations meant the Pentomic Division must fight in a non-linear fashion. Non-linear operations can be defined as "a battlefield upon which the commander, either by choice or lack of maneuver forces to cover all the terrain, has placed his forces in dispersed, noncontiguous areas from which he can operate to destroy enemy forces within his area of responsibility".⁶

To accomplish these objectives the Army redesigned the traditional triangular division of World War II and Korea into the Pentomic Division.⁷ The Pentomic Division had five Battle Groups (BG) instead of the traditional regiments of the Triangular Division. The BGs were larger than battalions but smaller than regiments in size and consisted of four rifle companies (later changed to five), a 4.2-inch mortar battery and a headquarters and service company. Battalion headquarters were deleted and the five BGs reported directly to division headquarters. By having five BGs instead of three regiments it was believed that the division would have more flexibility

than the old two up, one back approach to warfare.⁸ Because the BGs were not as large as regiments but larger than battalions it was believed that each BG in and of itself was not a lucrative nuclear target but still retained sufficient firepower. Additionally, by having five BGs the division could fight in any direction to support non-linear operations.

The tactical doctrine of the Pentomic Division became one of penetration by nuclear fires followed by exploitation for both offensive and defensive operations. In the defense this doctrine required units to disperse to absorb nuclear strikes without shattering then being capable of swift movement to prevent enemy exploitation. It also required units to operate independently from one another over a wide area. In the offense, after nuclear fires achieved penetration, the units had to move swiftly to exploit the penetration into the enemies rear areas and then disperse quickly so as to avoid becoming a nuclear target.⁹ Thus the offensive battle rhythm of the Pentomic Division was one of concentrate – strike – disperse.¹⁰

The AAN, as currently envisioned for the year 2025, also operates in a non-linear environment. The BFs of the AAN operate in a similar battle rhythm of concentrate – strike – disperse of the Pentomic Division. The BFs will operate independent of one another to move, strike, and move again in a simultaneous fashion in a distributed manner over operational distances.¹¹ While the AAN essentially uses the same battle rhythm as the Pentomic Division it does so in order to conduct quick decisive operations rather than to avoid destruction (i.e. nuclear strikes). The AAN BF concept does not mass (concentrate) units, but rather effects at the critical decisive points.¹²

The battle rhythm of the AAN BFs is envisioned to be very quick. It is composed of two alternating phases or pulses. The first is the combat pulse. During this pulse the AAN BF will conduct combat operations for a period of eight hours without any support. After eight hours of combat the BF goes to the second pulse, the logistics pulse. During this pulse the BF, in conjunction with its support regiment, replenishes its combat losses. The logistics pulse will not exceed twelve hours. Because there will be several BFs available for an operation some may be in the combat pulse while others are in the logistical pulse. Thus continuous operations are achieved through seamless transition of BFs alternating between the two pulses.¹³

The AAN BF will be smaller than a division but larger than a brigade and it will consist of six maneuver regiments, an artillery regiment, aviation regiment, reconnaissance battalion and a support regiment.¹⁴ The BF must be capable of operating autonomously for weeks¹⁵. It must also possess flexible mobile forces.¹⁶ While the Pentomic BGs attempted to defeat the enemy through firepower (nuclear) the AAN BFs do so through the operational maneuver of vertical envelopment.¹⁷ In short, the BFs will synchronize effects from all directions to converge upon and paralyze an enemy in order to demonstrate to the enemy the futility of their efforts.¹⁸

Like the Pentomic Division the AAN BFs require not only tactical mobility but also strategic mobility. Tactical mobility is required for the distributive non-linear operations while the strategic mobility is needed for crises no notice response by the BFs.¹⁹ The dilemma for the Army is that heavy division designs require too much strategic lift while light divisional designs lack firepower. The AAN BF, like the Pentomic Division, relies heavily upon dispersion, autonomy and flexibility to achieve

lethality and survivability. Both concepts tried/try to capitalize on new, emerging or anticipated technological advances to support their new methods of fighting. In the case of the Pentomic Division this reliance upon technology eventually led to the failure of the concept. Inadequate technological developments during the Pentomic Division's life span did not facilitate the command and control required for nonlinear operations and the sustainment of BGs. The belief that the Pentomic's technology would make everything else obsolete did not hold true.²⁰

Therein lies the necessity to fully explore the AAN concept in comparison to the Pentomic Division. The AAN relies heavily upon new, emerging and anticipated technologies. It is imperative to compare the two concepts and analyze where they differ and where the mistakes were made in the Pentomic concept. Without doing this, the Army runs the risk of duplicating the failures of the late 1950s in the next quarter century. To do so could cost the nation enormous resources, both in money and people, during a period of restrained/declining resources.

PROBLEM STATEMENT

The decisions made today and in the near future regarding organizations, equipment and doctrine of the Army will have a profound effect upon its capabilities, strengths and weaknesses. The ultimate success of the AAN concept will rely heavily upon existing and developing technology. These technological areas include, but are not limited to, information technology, communications, light weight materials, non-propellant munitions, efficient fuel cells and tactical aviation systems that move over tremendous distances at speeds significantly greater than today's aircraft. If these

technologies are not developed or fielded in sufficient quantities the actual AAN of 2025 will not be anything near what is being envisioned today.

The same could be said of the Pentomic Division during the period 1956-60. It too relied heavily upon technological developments. However, the technological capabilities present or developed during this time did not support the Pentomic concept. What started out as a futuristic new way of fighting ended in failure. The Army today, as it did in the 1950s, enters an area of high risk due to the time and resources involved to implement such drastic changes into the force structure of the Army.

A careful analysis between the Pentomic Division and the AAN concepts is the prudent thing to do in view of their inherent similarities. First, how are these two concepts different, and are these differences critical? Will these inherent differences enhance the AANs probability of success? What could the Army in the 1950s have done differently to ensure the Pentomic Division's success or was it doomed for failure from the start? Will the Army recognize the key shortfalls in the development/implementation of the Pentomic concept and avoid these same shortfalls over the next twenty-five years? In summation, is the environment such that technology will develop to support the AAN concept in a way that it did not support the Pentomic concept in the 1950s?

RESEARCH QUESTION

Is the AAN BF just another Pentomic Division design concept with the addition of advanced technology? The AAN BF and Pentomic concepts are very similar on the surface. They are also dependent upon technology for their success. In the 1950s

technology could not deliver to support the Pentomic concept. The question over the next twenty-five years is can it make the difference for the AAN BF concept.

However, there appear to be key differences under the surface of their similarities that enable the AAN concept a better probability of success over the coming years. These differences are in the areas of implementation of the AAN concept, pace of technological development, the social and political factors surrounding the concept and the actual use of the concept once implemented. Although some factors facilitate success, the AAN concept must be kept under constant review and critical analysis to insure it remains a viable concept and does not become too far detached from reality.

In view of the dollar cost and long range consequences for future Army readiness it is appropriate for the Army to take a critical look at the AAN concept in comparison to the Pentomic concept. Due to its significant impact upon the Army a healthy unbiased discussion involving the AAN and Pentomic concepts is warranted. It is with this view that this paper is written.

SELECTION CRITERIA

The criteria for comparison of the Pentomic Division and AAN BF concepts will be the five basic Tenets of Army Operations as defined in Chapter 2 of U.S. Army Field Manual (FM) 100-5, Operations, dated 14 June 1993. The tenets are as follows:

- a. Initiative
- b. Agility
- c. Depth
- d. Synchronization
- e. Versatility

The reasoning for selecting these tenets as evaluation criteria for the comparison of the two concepts is fourfold. First, they provide a relevant view of Army operations that is accepted not only by the Army itself, but also by many of its members. FM 100-5 is viewed as the authoritative manual for all Army operations, and it lends legitimacy to the criteria which is widely accepted by Army members. Second, these tenets have an enduring quality to Army operations. Thus, the comparison is more credible in view of this enduring quality. Third, they provide for a common understanding of Army operations and serve as a solid basis from which to start comparing the two concepts. Finally, these tenets drive all Army doctrine, whether it is in training, leadership, combat, combat support or combat service support.²¹ Therefore, any discussion of Army doctrine, past, present or future should include them.

CRITERIA EXPLAINED

Initiative is defined as:

“the ability to set or change the terms of battle and implies an offensive spirit in the conduct of all operations”²²

Initiative allows the commander to retain his operational purposes and tempo. By doing this the commander can then begin dictating to his opponent and thus limit options available to his opponent. If the AAN BF/Pentomic concepts can accomplish this then they could be considered to have the inherent quality of organizational initiative imbedded in them.

For example, if one of the concepts during offensive operations allows the enemy sufficient time to recover from the initial forward thrust then it cannot be said

that the concept possess initiative. If by its very nature, due to organizational structure or doctrinal employment, a concept does not put and maintain pressure against an opponent it does not have initiative as an inherent quality.

In order to possess initiative a concept should possess the ability to effectively conduct decentralized operations by having decision authority at the lowest possible levels. It should also attempt to shape (or control) the environment as much as possible in order to facilitate initiative and to limit options of the enemy. Lastly, it should have the ability to create and maintain fluid quick changing situations that create opportunities that can be exploited by the commander.²³

The non-linearity of both the Pentomic and AAN BF concepts promotes operations that will be quick and complex. The decentralized operations used by the concepts with their requirements to quickly concentrate (i.e. mass units or effects) dictates that the concepts possess agility. Agility is defined as:

“the ability of friendly forces to react faster than the enemy and is a prerequisite for seizing and holding the initiative”²⁴

The ability to act and react faster than a potential enemy is the key to agility. The ability to act quicker than the enemy is determined by both physical and mental qualities of the concepts. For the physical quality the mobility of the organization's forces becomes critical. Even if the commander knows where he wants forces to go, but they cannot get there in time by virtue of a lack of mobility (i.e. mechanized or aerial movements), then it will not matter if he has correctly analyzed the battlefield.

In order to correctly analyze the battlefield then the commander must have the mental ability to do so. This includes command and control structure, communications

and training. This allows the commander to exploit situational awareness so that he can use his mental skills to act decisively without hesitation.

If a concept supports both the physical and mental quickness then it can be seen to have agility that would lead to rapid and consistent concentrations against enemy vulnerabilities. This would support disruption of enemy plans and force him to alter his plan and begin to piecemeal his combat power. This theoretically allows a smaller force to defeat a larger force in detail.

Again, due to the nonlinear operational nature of the concepts they must support the tenet of depth. Depth is defined as:

“the extension of operations in time, space, resources, and purpose. These factors vary by echelon and by constraints given to commanders”²⁵

There are two key parts of depth that a concept must possess if they are said to support this tenet. First, the concept must have the ability to see throughout the depth of the battlefield and be able to gain information as a result of this ability. The Army normally does not solely possess this ability with its organic assets and therefore it follows that the concept must be able to operate in a joint environment to collect information. The ability to effectively integrate joint operations with the concept, whether it be other services or national intelligence assets, is critical to the concept.

Second, the concept's ability to conduct attacks simultaneously on different targets (against both forces and capabilities) throughout the depth of the battlefield to achieve an effect is essential for this tenet. By doing this a commander allows for greater sustained momentum and again forces the enemy to fight on the commanders own terms. The idea of sustained momentum requires secure lines of communications

(LOCs). If LOCs cannot be established, sustained or maintained then most likely attacks in depth will not be achievable.

Depth is achieved when three conditions occur: (1) there is a capability to attack in depth; (2) LOC's are established and secure; and (3) information throughout the depth of the battlefield is available.

The next tenet for comparison is synchronization. Synchronization is defined as:

The ability to focus resources and activities in time and space to produce the maximum relative combat power at the decisive point”²⁶

A concept's ability to integrate all resources to achieve a desired effect is fundamental in its support of synchronization. As an example, if a concept cannot effectively integrate maneuver forces with logistics, intelligence, fire support and air defense then it does not support synchronization.

Implied in this is the ability to coordinate these different activities at different times and locations throughout the nonlinear battlefield. This leads to the idea of the whole being greater than the sum of its parts. If this coordination is not achieved then all possible resources are not being committed at the decisive points of decision. The result of this would be a concept that does not maximize resources in time and space to achieve success and leads to a sub-optimization of assets. If these assets are not synchronized then overwhelming combat power is not achieved at the decisive points in an operation.

A concept that does not achieve synchronization has inherent vulnerabilities that a potential foe could capitalize upon. Thus the probability of success for the concept in actual combat is greatly reduced and the commander assumes greater risk.

The last tenet to discuss is versatility. Essentially, the concepts must be able to effectively meet the demands of conflict across conflicts broad spectrum. Versatility is defined as:

“the ability of units to meet diverse challenges, shift focus, tailor forces, and move from one role or mission to another rapidly and efficiently”²⁷

Experience in the 20th Century has demonstrated that U.S. Army units must be able to conduct not only big total war operations but also everything short of this. This would include, but is not limited to, limited war, guerilla war, counter insurgency operations and operations other than war (OOTW).

If a concept possesses the ability to rapidly and smoothly transition from one type of operation to another then it supports this tenet. If a concept cannot do this the its value to the nation is greatly decreased because of its limited employability. Thus if a concept relies too heavily upon a certain type of equipment or organizational structure it may not be able to efficiently and rapidly transition from one mission type to another.

Versatility for each concept depends upon personnel who are trained and competent across the spectrum of operations. If by the nature of their concept they become experts solely in a particular type of operation then their versatility is greatly decreased. In a sense these concepts and their personnel should be multi-functional in order to support versatility.

IMPORTANCE OF CRITERIA

The above tenets overlap one another and rely upon one another for the ultimate success of an Army operation. Their value is tried and tested and relevant to any comparison between the two concepts. They serve as a sound foundation from which to evaluate any old or new Army concept of operations or force structure. Ignorance of these five basic tenets, while not ensuring defeat, would lead to operations that are more costly in time and resources to the Army and the nation.

CRITERIA ANALYZED

Both the Pentomic and AAN BF concepts recognize the importance of initiative. Because of its implied offensive spirit, initiative is seen as the decisive form of war.²⁸ Wars in the 1950s, as well in the year 2025, are seen to be won by conducting offensive operations in order to have an opponent comply with your will.²⁹ Thus, the ability to conduct sustained offensive operations allows the commander to dictate tempo to an enemy force and thereby reduces enemy options on the battlefield.

The Pentomic Division concept recognized this ability to maintain initiative from the very beginning. It emphasized the ability to maximize the use of offensive actions. Because the concept was seen as central to the defense of Western Europe from Soviet aggression it was believed that the Soviets would attack first. Therefore counterattacks became a cornerstone capability of the Pentomic concept. The ability to turn the tables on the attacker and being able to move from the defensive and to the offensive was critical to the Pentomic Division.³⁰ One method of accomplishing this task was seen as actions by independent minor units using mission guided orders. These units would have to possess the capability to conduct operations without support

from higher echelons for extended periods of time.³¹ The Pentomic Divisions Battle Groups were viewed as these minor units. The BGs were larger than a traditional battalion and possessed more firepower but were not viewed as a lucrative target for Soviet nuclear strikes.

The mere threat of nuclear weapons on the 1950s battlefield forced the Divisions five BGs to disperse from one another in a “cellular” fashion. This dispersed type of deployment of units caused a conflict with the BGs ability to mass to defeat a possible Soviet penetration to turn the initiative over to the Pentomic Division. The solution to this dilemma was to deploy powerful nuclear weapons to the Pentomic Division.³² This cellular approach to the battlefield was believed to have three key advantages over the previous triangular division organization. First, with five maneuver BGs it was felt that the Division could conduct operations in any direction at any time. Thus there was a feeling that the Division was more flexible over its predecessor. It was also believed that there was no true rear area to the Division because of the deployment of the five BGs in a defense in depth. This reduced the Divisions vulnerability to Soviet envelopment. Lastly, the loss of one BG would not be as catastrophic as the loss of a regiment in the triangular division structure.³³

The doctrinal tactics of the Pentomic Division allowed it the opportunity to take away the initiative of a potential enemy through firepower. Namely, in the form of nuclear firepower. The use of tactical nuclear fires would first stop a Soviet advance. Then they would be used to create a penetration that would be exploited by lighter mobile forces. Because the penetration would be along a narrow front a column attack formation was the preferred form of maneuver. Due to the narrow frontage and lack of

conventional firepower from lighter units there was a diminished capability of conventional firepower at the point of decision. This doctrinal tactical offensive tactic did not allow for any real flanking or maneuver deviation. These tactics could be viewed as simplistic in nature and merely substituted firepower for maneuver. Thus the belief in firepower to shatter an opponent, like in World War I, was alive and well some 40 years later.³⁴ It seemed the only real technical question to these tactics was how to pass units through the penetration for exploitation operations.³⁵

The nuclear firepower for these tactics was to be supplied from Honest John, Corporal and Little John rockets. These systems were fielded to the Pentomic Division though a variety of technical problems existed with each.³⁶ While there was a reliance on tactical nuclear weapons with ranges of 10 to 22 miles for the Division, new and improved conventional weapons were also emphasized.³⁷ This reliance developed because of the requirement for the nuclear weapons to do the actual fighting. One of the biggest missions for the divisional commander had been locating a possible target for his nuclear weapons. Conventional weapons that were to support the concept came in the form of improved tanks and self-propelled artillery, improved anti-tank weapons and improved ammunition.³⁸ The purpose of these systems was to increase survivability by increasing both mobility and armor protection. These new systems were not available at the time of the Pentomic Division reorganization and were never fielded.

The Battle Groups of the division were seen as being capable to conduct these independent sustained battles.³⁹ The reliance on nuclear fires had reduced conventional artillery and armor in the division in order to save on manpower in the

division. The armor that was left organic to the division, a battalion of 54 tanks, was often parceled out to the individual BGs. Thus the ability to mass armor to support a penetration and exploit it was diminished.⁴⁰ In short, conventional performance had been traded away for the theoretical performance of nuclear weapons.⁴¹

However, problems concerning the dependence on nuclear fires quickly arose that challenged the basis of the concept. Exploitation of nuclear capabilities required low level decision authority for their use. This concern was the ability to quickly employ these fires. Upon initiation of the Pentomic concept it was assumed that the release authority granted by the NCA for nuclear weapons in the division would be kept at the division or BG level. As time went on though, the NCA became more and more reluctant to grant this lower level release authority. The inevitable delays and time lags between location of suitable targets and fleeting opportunities for penetration would quickly pass on the modern battlefield.⁴² Furthermore, due to the use of nuclear weapons, operations at the tactical level became more centralized up the chain of command as opposed to decentralized. Again, because of the inherent ramifications of the use of nuclear fires and the risk of fallout from their use required more centralized control by the divisional commander over BGs. The goal of independent decentralized operations using mission orders was not accomplished.⁴³ In fact, all field tests concerning the Pentomic Division were highly controlled and orchestrated experiments.⁴⁴ It became apparent that what was technically possible was not politically feasible.

Other factors also effected the Pentomic Division from achieving initiative on the battlefield. First, because the division had been reduced in manpower in relation to

the triangular division the BGs were not large enough to conduct conventional operations in the absence of nuclear fires. When nuclear fires were not forthcoming the division did not have the ability to conduct sustained attacks in order to seize the initiative. In fact, it was not even strong enough to conduct an aggressive defense.⁴⁵ Its ability to conduct a mobile defense in depth, a requirement for the nonlinear battlefield, became impossible due to the lack of staying power of the BGs. It quickly became clear that the Pentomic Division was best suited to a static defense as opposed to a mobile defense. Any hope of seizing the initiative, without the use of nuclear fires, became difficult if not impossible.⁴⁶

Logistical factors also impeded the Pentomic concept from attaining initiative. The basic concept of support was for the BGs to operate independent of higher level logistical support for distances up to 100 miles. At that point the field army would essentially push support to the BGs due to the distances involved.

With BGs only having a support platoon in its Headquarters and Service Company it lacked the ability to support itself. The ability to conduct sustained continuous operations, whether in the offensive or defensive, could not be accomplished. While new combat service support equipment was to be fielded to support this reduced structure of the BG it was too immature technically or not fielded to meet the requirements of support.⁴⁷ Additionally, the BGs organically had only one truck squad to exploit the penetration of nuclear fires. There was essentially no way the BG could hope to move its five non-mechanized rifle companies organically without considerable support from the divisional transportation battalion.⁴⁸ Fundamentally, there was no realistic way for the BG commander to achieve the

initiative against the mechanized tank-heavy forces of the Soviet Union. Lastly, the thin logistical base of the Pentomic BGs required troops from the rifle companies to be detailed to the support platoon in order to conduct normal re-supply operations. This led to a further diminishing of conventional combat power in the BG. In actual combat, which the Pentomic Division never participated in, the attrition of logistical support personnel to combat loss would have further exacerbated the problem even more.⁴⁹

As the evidence suggests and as reality demonstrated the Pentomic Division and its BGs never achieved the ability to have true initiative in its operations. This was due to the over reliance on nuclear fires and a poor logistical base of support that the division operated from.

The AAN BFs attempt to achieve initiative by a different method. Maneuver becomes more important than firepower in this concept. Vertical envelopment significantly enhances maneuver. While the BF still relies on key terrain to mask and secure its movements, vertical envelopment significantly enhances maneuver. Vertical envelopment is also reinforced and complimented by joint fires in order to suppress and set conditions for the success of the maneuver. The AAN BF concept does not require the destruction of large enemy forces to create a penetration that allows for exploitation. It proposes the suppression of enemy fires to allow for freedom of maneuver to position BF elements at decisive points on the battlefield.⁵⁰ In this concept there is a movement away from reliance on firepower to defeat potential enemies. In other words, maneuver coupled with the effects of precision guided munitions becomes the principal elements in achieving initiative.⁵¹

The battle rhythm of the BF also supports initiative. Instead of the single narrow frontage penetration employed by the Pentomic concept, the AAN concept is to attack simultaneous targets at different locations. This forces a potential enemy to spread out and disperse his combat power. The ability to shape the battlefield or environment is better achieved by the ANN BF concept. It also keeps the enemy off balance because the enemy does not know when or where the next attack will take place. The BFs then begin to dictate tempo to an enemy as well as take away possible options to the enemy. The AAN BFs employ a pulsing concept by rotating in and out of combat to sustain pressure on the enemy and to maintain the initiative. Again, because of the narrow frontage of the Pentomic penetration tactics only one or two BGs could be brought to bear in an offensive mode. Lastly, the AAN BF Concept embodies a more offensive spirit. It attempts to conduct pre-emptive strikes against an enemy center of gravity as opposed to locating an enemy's main/most dangerous thrust and then attacking it. Initiative is achieved from the beginning instead of attempting to seize it from an enemy.⁵²

When destruction of an enemy center of gravity does occur the AAN BF concept relies upon the massed effects of conventional precision guided fires. These may include joint fires, close air support, helicopters, indirect fire systems, direct fire systems and Information Warfare.⁵³ There is no reliance upon a single weapon or weapons system (i.e. nuclear fires) as there was in the Pentomic concept. Due to the conventional nature of the AAN BF weapons systems there is also no delay caused by the need to obtain authority to use these weapons from higher headquarters. The

response of these massed weapons effects will be more rapid and responsive to the commander in order to maintain initiative.

The BFs also have a more robust organic transportation capability than the Pentomic Division had. In the 1950s air transportability was not viewed as compatible with sustained decisive operations.⁵⁴ The Advanced Air Frame (AAF), a tilt rotor aircraft, will move all the BFs organic equipment and personnel to anywhere on the battlefield. Though this may take more than one lift, depending upon the type of BF, the bottom line is that all equipment in the AAN will be air transportable by the AAF. The Pentomic BGs depended too much upon higher echelon transportation assets while the BFs of the AAN do not. Additionally, the BFs have sufficient ground vehicles to move its troops with one lift. The BFs do not rely upon a higher echelon for ground transportation on the battlefield, which allows the commander to maintain the tempo and initiative.⁵⁵

In terms of sustainment capabilities the BF contains a robust capability with its support regiment. This regiment consists of 1600 personnel.⁵⁶ This is a vast improvement over the Pentomic concept that only had a support platoon to sustain the entire BG. The ability to sustain the tempo as envisioned in the battle rhythm of the BF is greatly enhanced by the BFs support structure. While some BFs may be out of direct support for up to eight hours, others will be in the support phase. This creates a continuous support flow for logistical units that enhances initiative. Additionally, the ability to support BFs in the combat phase exists with the use of AAFs and logistical UAVs. Thus the use of ALOCs will be critical for BFs in the combat phase. This

means that as initiative is achieved it will be much easier to maintain throughout the duration of any particular operation.

In terms of initiative the AAN BF has an inherent advantage over the Pentomic Division. Its reliance on multiple weapons systems effects as opposed to one, less reliance upon higher echelons for mobility to maintain initiative and its increased organic logistical support capabilities separate it from the Pentomic Division. As envisioned now, these characteristics of the AAN BF better support the tenet of initiative.

Both the Pentomic Division and AAN BF concepts attempt to attain agility through technological developments. One of the key factors leading to success of these proposed technological developments was the time span considered. For the Pentomic Division it was a short time span of five years, 1956-60, in which technology had to develop the equipment in order for the concept to achieve agility. For the AAN BF concept this time span increases to over 25 years. With the exponential growth in computer/microprocessor chip technology, the AAN BF concept has a distinct advantage over the Pentomic concept. However, the 25 year time span may be required to support automotive and aerial technological growth that is more linear in nature.

The Army recognized that increased tactical mobility was required for the physical side of agility in order to act and react quicker than a potential enemy. The minimum number of vehicles required for the BG was the number to move a unit's personnel and authorized loads without shuttle operations.⁵⁷ The ability for units to move independent of one another without reliance upon outside sources for

transportation was required to achieve local superiority for the penetration and exploitation operations.⁵⁸

As a result of this requirement for improved tactical mobility there were many design efforts directed at equipment improvement to deal with the problem. The items that began development were novel and innovative. Some examples include the new armored vehicle (tank) that was to have the speed of a passenger car, weigh no more than twenty tons, have less fuel consumption and reduce radiation effects by 95%. New lighter and stronger metals were believed to be the answer for the new tank. New Army aircraft were to have more speed, require less fuel, be more rugged to withstand the rigors of combat, easy to maintain and not require a airfield for its use.⁵⁹ A “maintenance free” truck was considered that could travel up to 1,000 miles without servicing and then be discarded.⁶⁰ The GOER program was also developed in the 1950s. This program attempted to achieve greater mobility for wheeled vehicles in support of the Pentomic concept. First, it tried to increase load capacities of vehicles while increasing speed in all types of terrain. The second goal was a reduction in maintenance required and sustained freedom from breakdowns. These vehicles looked very similar in appearance to the current family of HEMTT vehicles in the Army inventory.⁶¹ Lastly, other vehicles that were developed were an improved Armored Personnel Carrier (M59 and T113) and an Armored Vehicle Bridge Launcher (AVLB).⁶²

The search for increased tactical mobility in support of the physical side of agility did not stop on the ground. The Army saw the helicopter as the ultimate answer to tactical mobility and re-supply on the nonlinear battlefield.⁶³ Helicopter strength in

the Pentomic Division increased from ten in the old triangular division to 28.⁶⁴

Though this was a significant increase in the quantity of organic airframes, the ability to airlift equipment, supplies or personnel was at a minimum level.⁶⁵

Because of the no notice requirement to deploy anywhere in the world the Pentomic concept also emphasized the ability of units to be air transportable. Strategic air therefore also became a prime objective for the Pentomic concept. A universal air transportable division was envisioned for the Pentomic concept. This was to be accomplished by developing and procuring lighter equipment. However, the Honest John rocket system kept the Pentomic Division from achieving this for the airborne version of the Pentomic design that was the most air transportable of all Pentomic designs. The Infantry Division version of the Pentomic design merely tried to make equipment as light as possible but never achieved air transportability.⁶⁶ Thus the avowed policy of not fielding equipment that was not air transportable was consistently violated throughout the life span of the Pentomic concept.⁶⁷

One of the assumptions regarding the search for mobility for the Pentomic concept was that technology would advance significantly enough to support the concept. Due to the limited time frame of five years though this never happened.⁶⁸ For example, the GOER program never fulfilled its promise due to poor maintainability. Compounding this problem was the Army's mis-allocation of money towards the Pentomic concept. The reliance on and fixation with nuclear missiles and rockets led to a disproportionate amount of Research and Development (R&D) dollars going to those programs. Programs to support conventional weapons and vehicles received a much smaller proportion of resources. For example, in 1957 43% of the

R&D budget dollars went towards missile programs while only 4.5% went to vehicles, 4.0% to aircraft and 4.3% to artillery.⁶⁹ Thus the Army never adequately funded the ability to achieve physical agility for the Pentomic concept.

The result was that the BGs were only 37% mobile. What transportation assets that existed in the division were mostly pooled at division level.⁷⁰ This lack of mobility meant, that at most, only two BGs at a time could be transported using all the transportation battalions APCs and trucks.⁷¹ As an example, the T113 APC was developed in the 1950s for the Pentomic concept. Due to funding constraints this vehicle was not available until the 1960s long after the Pentomic concept ceased to exist. Essentially, the Pentomic Division continued to use the same equipment that was used in World War II and Korea but merely changed the organization.⁷² The ability for a concept to have its own equipment designs available for its use is critical to its success.

On the mental side of the equation for agility the Pentomic Division fared little better. With the increase from three to five subordinate maneuver units the span of control of the division staff and commander was greatly expanded. This was believed to be offset by new modern signal equipment.⁷³ It was recognized that the tempo of the nonlinear nuclear battlefield would be much quicker than had been previously experienced. Both commanders and staffs would have to adjust to meet this requirement. The commander would have to make decisions quicker and maintain a sense of balance in the chaotic changing environment.⁷⁴

This tempo would require new equipment, organization and skills in personnel to make it work. With the exception of the organizational changes there was no real

change in equipment or skills of the people.⁷⁵ On the equipment side the signals communications equipment suffered much the same fate as vehicles at the hands of nuclear missile technology. Also, the reduced five-year window of development meant that technology could not keep up with the dispersion of the battlefield.⁷⁶ As far as people were concerned the Army was still operating as a draftee army with a two-year enlistment. The requirements of the nonlinear battlefield demanded personnel with experience and training. The Army could not hope to develop the personnel stability such an environment required.

The AAN BF stands a much better chance of success in achieving agility in both the physical and mental aspects. The expanded time frame for development of technology to support the concept is more likely to produce the equipment required by the BF by 2025.

The R&D effort of the AAN BF focuses as much upon maneuver/mobility as it does on firepower.⁷⁷ This is a reversal from the Pentomic concept where the focus was on firepower primarily. This holds true not only for the tactical mobility of the BF with its organic vehicles and aircraft but also in the arena of strategic mobility. The AAN BF not only relies heavily upon air transport to get elements to the battlefield but also to conduct aerial delivery for support. This emphasis means that the AAN BF has a higher probability of achieving agility in the physical sense. This will better support the concept in being able to concentrate forces quickly as well as acting/reacting quicker than potential enemies. The current development of the Mobile Strike Force (MSF) undoubtedly will provide the AAN BF with a rich source of data and experience in developing its mobility assets and command and control structure for the future. In

a sense the MSF will serve as a realistic test bed for the many concepts of AAN. This is something that the Pentomic concept did not have the luxury in having.

In terms of the mental side of agility the current environment of change and development in Information Technology (IT) will support the AAN BF. Both the Force XXI and MSF are logical stepping stones in developing equipment and personnel to meet the demands of the AAN BF tempo. In fact, a recent Rand study has stated that if the IT of today was present in the 1950s then the Pentomic concept would have worked much better and possibly not failed in the long run.⁷⁸ The real problem in the future of IT may be not in the actual hardware to support the AAN BF but how the Army integrates it and trains its people on it.

In respect to developing personnel to support the AAN BF the concept takes a different approach to the problem than the Pentomic concept. Whereas the Pentomic concept took two year draftees and placed them into the Pentomic Division the AAN BF concept requires personnel to serve in an "apprenticeship" program before being selected to the AAN BF. These people will have relevant experience and training to the AAN BF which will develop the high technical skills required for AAN BF operations. Lastly, these personnel will serve with the BF for an extended period of time and not just a two or three year assignment.⁷⁹ This will present a challenge to the Army of the future if current trends in retention continue well into the next century. Again the environments of both Force XXI and the MSF will act as a solid foundation from which to draw people from. In short, the AAN BF concept is not a quick rush to meet a threat but a more calculated and logical process of development than the Pentomic concept.

In terms of agility the AAN BF possesses a better prospect of success in both the physical and mental spheres. It is a more deliberate thought out approach than the Pentomic concept. The increased time frame for development will allow technology and the Army to make sensible refinements over the next 25 years. There should be no rush to put something out into the field like the Pentomic concept did. The AAN BF must have both the people and equipment in place to achieve agility by the year 2025.

The dispersed nonlinear operations of both the Pentomic and AAN BF concepts requires that both concepts be capable to conduct operations in depth. Both concepts attempt to deal with operations in depth and its sub components ability to gain intelligence throughout the battlefield to establish and secure LOCs, and the ability to conduct simultaneous attacks in depth.

The Pentomic concept envisioned a battle zone of up to 100 miles in depth. Those distances were to be offset by air vehicles.⁸⁰ The perceived increases in maneuverability and fire support led to the increased significance of battle space on the nuclear battlefield.⁸¹ However, as these distances increased the limits of the equipment available did not fully support the physical distances involved for these nonlinear operations. For example, the distance between BGs was between three and five miles. The Army had no target acquisition systems in the inventory to cover such distances.⁸² The long ranges of the nuclear battlefield dictated that information awareness would become more and more critical. If a commander could not see the distances required of the nuclear battlefield there was no way he would be able to know when or where to mass fires or units.⁸³ The Army began to develop a myriad of systems to assist the commander in achieving this situational awareness. They included short, medium and

long range tactical surveillance radar; side looking radar for aircraft; long range cameras; drone systems⁸⁴; combat area radios; area (grid) communications systems; hand-held televisions and radio facsimile systems.⁸⁵ These systems also suffered from the emphasis for dollar spending on nuclear missiles and rockets. In the end the Pentomic Division could not rapidly process both visual and photographic reports in a timely fashion.⁸⁶

Compounding this problem of intelligence gathering for the Pentomic Division was the increased span of control of both Division and BG headquarters. While the span of these two headquarters was thought to be optimal by maximizing the span it turned out to be too great for the systems on hand to control.⁸⁷ While the Division had enough problems controlling its five BGs, the BGs themselves had even greater problems controlling their five rifle companies. Once these companies were tactically deployed on the battlefield it became impossible for the BG to effectively conduct any operations of depth.⁸⁸

The shortfalls in information/intelligence gathering also impacted upon the Pentomic Divisions capability to conduct simultaneous attacks in depth. The ability to obtain a clear picture of the battlefield in a timely manner made such attacks difficult to conduct. Additionally, as with the transportation systems of the division, most of the conventional field artillery (FA) assets were kept at the division level in order to be utilized in a direct support fashion as the division commander desired. The BGs only had a 4.2 inch mortar battery organic to it. This mortar battery had its own fire direction center for command and control purposes. This concept of organization of the FA assets was seen to support dispersion by not making the BG too large a target

for nuclear fires. Also, the BG would become a more independent force because it had its own organic fire support.⁸⁹ This in reality only hampered the BG commander from conducting any real effective deep fires on the battlefield.

With its nuclear fires the Army was attempting to conduct deep fires. But with the exception of the nuclear weapons the Army did not possess this capability. The inability to conduct effective intelligence and targeting did not help either.⁹⁰ With the inability of the organic means to accomplish this the natural tendency of thought would be why did not the Army turn to the Air Force to assist in conducting these proposed deep attacks? In short, the political environment between the two services precluded any real effective cooperation between them. The competition for decreasing funds from Congress for defense between the two services and the Army's development of guided nuclear missiles with their inherent operational range led to a non-cooperative atmosphere between the two services. The Air Force was not going to assist the Army with this problem at its own fiscal downfall.⁹¹ Thus joint fires could not be achieved to solve the problem of deep simultaneous attacks.

In regard to being able to establish and maintain LOCs in support of operations in depth the Pentomic concept failed to adequately deal with this challenge. The logistics structure of the Pentomic Division was thought to give the BGs a capability of independent operations without support for up to 100 miles. It was further felt that aerial re-supply would be possible to support the BGs.⁹² This belief in aerial re-supply was fueled by two factors. First, it was conceded that with the BGs fighting independent actions in non-mutually supporting positions could not cover the gaps between them with either direct or indirect fires. The enemy then could act with some

impunity between the BGs. Thus, ground LOCs could not be maintained. Second, because the BG was smaller than the traditional regiments it replaced it was felt that its logistical requirements would be smaller and easier to support by aerial means.⁹³ Again, even though the Pentomic Division increased its aircraft and helicopters over the triangular division, they were not in large enough numbers to fully support continuous aerial re-supply operations. Additionally, the aircraft/helicopters that were available did not have the load capacity to support a BG effectively.⁹⁴ The theory of ALOCs to support the Pentomic Division BGs became infeasible in light of the equipment available to conduct such extensive operations.

The AAN BF concept also attempts to deal with the challenges of depth in the areas of information/intelligence acquisition, simultaneous attacks throughout the battlefield and maintaining LOCs to support the BFs once they are deployed. The concept lays out in better detail than the Pentomic concept did in how it is to achieve success in each of these areas in order to support operations in depth.

The hardware available today already gives the AAN BF concept an advantage over the Pentomic concept in relation to the AAN BFs being able to achieve situational awareness. The satellite communications, ground-positioning system, Inter Vehicular Information System (IVIS), improved fire control and target acquisition systems allow for effective operations in depth.⁹⁵ The AAN BF concept takes existing capabilities further by stressing the use of information operations and use of Joint assets in order to accomplish this task. These assets are used to determine enemy vulnerabilities, centers of gravity and intentions in order to gain a situational awareness that can be utilized to exploit opportunities in maneuver and targeting.⁹⁶ The concept does think in "Army

only” terms but emphasizes the need to fully integrate other services in the AAN development and eventual force organization.

This emphasis on joint capabilities applies to the concepts ability to conduct simultaneous attacks throughout the depth of the battlefield. The Army does not intend on going it alone in respect to this task like the Pentomic concept did. The use of joint fires in order to suppress enemy forces and to provide for suppression of enemy air defenses against numerous targets at the same time allows the BFs to maneuver at operational depths.⁹⁷

Lastly, in terms of LOCs the AAN BF concepts emphasis on maneuver over firepower lends to natural development of systems and doctrine to develop the use of ALOCs. By virtue of the BFs deploying to the battlefield via air to separate locations the ALOCs become a central feature of the concept. It is not just an afterthought to the method of fighting being considered. The CSS elements of the BF will also have their own aerial platforms from which to support the BF. These include the Advanced Precision Aerial Delivery System and/or the Guided Parafoil Air Delivery System to provide the aerial delivery of support.⁹⁸ These systems are unmanned guided aerial delivery platforms that can deliver supplies to both rear and forward areas of the battlefield from CONUS. Besides the decreased fuel and ammunition requirements of the BF, the eight-hour combat pulse reduces the overall requirement of re-supplying the BF in forward areas. With the BFs returning to secure mission staging areas for the logistic pulse every eight hours the need to move large quantities far forward will decrease dramatically. The ALOCs will become more a line of maneuver than re-

supply. The Pentomic concept never considered the rotation of BGs in and out of forward positions because it did not have the tactical mobility to do so.

The AAN BF will have a significant advantage over the Pentomic concept in achieving depth of operations on the battlefield. Its emphasis on Joint operations in conjunction with the more positive relations between services currently enjoyed and expected to continue into the future will be an important factor in the concept achieving depth. The emphasis on mobility by all elements of the BF instead of an over-reliance on firepower will also make a difference in the concepts ability to conduct operations in depth.

The next tenet to compare the Pentomic and AAN BF concepts against is synchronization. The requirement to mass combat effects, i.e. combat, combat support and combat service support; greatly enhances a concepts ability to be successful on the battlefield. This is especially true on a nonlinear dispersed battlefield. A concept that cannot synchronize effects at the decisive points and times runs the risk of piecemealing combat power over time.

Like the other tenets previously discussed the Pentomic concept recognized and attempted to deal with synchronization. Due to the inherent nature of dispersion on the nuclear battlefield the need to quickly mass at decisive times and places in a quick manner, the ability to synchronizing this massing became critical. These decisive points and times were after the nuclear strike to create penetration or stop a Soviet penetration. Initially, the ability to mass units, reserves and/or supplies was seen to be accomplished by aerial vehicles.⁹⁹ By accomplishing this the Pentomic Division could mass both nuclear and conventional fires along with other resources to achieve success.

Thus the need to effectively control these geographically disparate assets to mass was a key objective of command and control of the Pentomic Division. The greater dispersion of the Pentomic Division over the triangular division would end up creating problems with its ability to effectively synchronize these units and resources. The fact of the matter was that the division had more subordinate units to directly control spread out over greater distances.¹⁰⁰ In the end, the span of control of the division commander and his staff was too great. In the Pentomic Division there were sixteen different subordinate units to command and control.¹⁰¹

The need to mass dispersed units and fires to fight a highly synchronized battle requires advanced systems of communications and intelligence gathering.¹⁰² The Pentomic concept attempted to develop the systems capable of accomplishing synchronization. The need to develop these new systems was even more paramount in view of the fact that the battalion level of command had been dissolved as a result of the Pentomic concept. This would create a void that technology was meant to fill.¹⁰³ Some of the things the Army gave the Pentomic Division to overcome these hurdles were organizing the division with a signal battalion instead of a signal company. This was in addition to the addition of both the organic transportation battalion and aviation company that were to assist with the massing of units. Lastly, a new doctrine of CSS support appeared. This system of support was a throughput system designed to push supplies to the BGs directly from the Field Army level in theater.¹⁰⁴

In conjunction with these technological and doctrinal additions to the Pentomic concept, a new system of organization and method of operation for staffs was attempted at the divisional headquarters. This reorganization of the division level staff

sought to streamline the staff by reducing the layers of the staff in order to speed up the flow of information. This in turn would lead to a quicker and more informed decision making process by the division commander in order to meet the demands of the fast paced nuclear battlefield.¹⁰⁵

However, the ability of these changes to help the Pentomic concept achieve synchronization was lacking. For example, while a signal battalion was given to the division the anticipated exponential growth of advances in communications to support the concept did not occur.¹⁰⁶ The demands of synchronization quickly overcame the communications ability to support it. The logistical systems, primarily in the transportation arena, though increased in capability remained largely inflexible and could not meet the synchronization requirements of the concept.

Compounding this problem was the inherent lack of conventional combat power of the BGs themselves in relation to their predecessor regiments of the triangular division. Where it once took one or two regiments to complete a combat task it now took three or four BGs. The increase in synchronizing the increased numbers of units could not be accomplished by the means at hand.¹⁰⁷

Another problem was in the area of heavy artillery assets. Most of the heavy artillery was organized at missile command levels in the combat zone in the theater of operations. This forced an increase in synchronization demands on the division commander because he did not possess effective control over these key combat systems. The inevitable delays in such an organizational set-up led to the lack of responsive and synchronized heavy artillery support.¹⁰⁸

The end result of the synchronization problem for the Pentomic concept was that it was lacking in relation to the requirements placed upon it. There was no real ability to achieve a synergistic effect between the conflicting needs of dispersion, mobility and flexibility.¹⁰⁹ This became apparent during DESERT ROCK VI in 1955 when Task Force RAZOR was unable to achieve synchronization in massed combat effects. In the end this exercise demonstrated that it was essentially impossible to send reconnaissance and logistical units with a combat force to exploit a penetration created by nuclear fires. These “soft “ assets could not only not keep up with a quick armored force but also could not operate effectively in the area due to the blast effects of radiation.¹¹⁰

The AAN BF concept recognizes the requirement for a capably robust command and control system to assist in achieving synchronization of effects on a nonlinear battlefield. Even small units that have the ability to conduct continuous sustained operations require a solid over arching system that creates cohesion and synchronization. The concept recognizes that these units, while potent, become merely individual small pieces on the battlefield with marginal worth.¹¹¹ The key initiative in the concepts IT development is to increase not only situational awareness but also to speed the flow of information in order to achieve synchronization.¹¹²

The AAN BF concept emphasizes the need to synchronize all functions in order to achieve a fully integrated combined arms effect on a potential enemy. This not only includes the BF's organic capabilities and units but also joint systems of the Air Force, Navy and Marine Corps. By achieving these massed effects the AAN BF attempts to overwhelm an enemy at decisive points in order to achieve success.¹¹³ The ability to

synchronize these massed effects will be enhanced through long range sensors and information systems that will allow company sized elements to operate up to 50 kilometers from one another. With this visual and digital awareness the AAN BF commander will possess the capability to know when and where to mass effects with previously un-thought of speed.¹¹⁴

The ability to rapidly transmit this information awareness will be assisted by the increasing use of commercial communications systems. These will be mainly in the area of satellite based systems.¹¹⁵ The systems will give the AAN BF the benefit of not only increasing the speed of information flow but also the quantity and timeliness of it. Additionally, these systems will be more reliable and redundant than an Army only system of communications. With all elements of the BF having access to this information flow the information becomes transparent and seamless at all levels in the BF. This will allow the individual elements a greater ability to anticipate future operations that will facilitate the ability to synchronize the geographical elements of the BF. Synchronization will not only become quicker but also easier to achieve than what was anticipated by the Pentomic concept.

The addition of the organic transportation assets of the AAN BF coupled with its inherent myriad of conventional fires capabilities will facilitate the concept in achieving synchronization. In terms of synchronization the AAN BF has a decided advantage over the Pentomic concept. The emphasis on massed effects and information awareness is what separates the AAN BF concept from the Pentomic. The multiplier in its overall conceptual ability to achieve synchronization is its integration with other services and redundancy of communications and information systems into

the commercial and national sectors. In the AAN BF concept there will be no one thread that is vulnerable to failure.

The last tenet to compare the AAN BF concept to the Pentomic concept is versatility. The ability of units to quickly and with a minimum of turbulence to move from one type of operation to another has been a hallmark of Army operations. Units with the capability to do this have an intrinsically higher value to the nation than a stand alone specialized mission type of unit.

Early in the concept the Pentomic Division was viewed as a flexible force that could operate effectively anywhere along the spectrum of conflict. With its five BGs the Division was viewed as inherently flexible as it could mix and match the five BGs into any size force to meet the diverse challenges of conflict.¹¹⁶ While the concept was designed primarily to fight as a part of NATO on a nuclear battlefield in Europe it was felt that the force could go anywhere in the world to deal with any type of contingency.¹¹⁷ The use of the Pentomic Division was seen all along the spectrum of conflict. Besides its role in traditional conflict it was believed it had a value in OOTW. It could be utilized as a show of force, treaty enforcement, in international police actions and as an occupation force. The wide variety of capabilities the division possessed went from sentry duty to a powerful deterrent role due to its organic atomic delivery capability.

The Pentomic concepts over reliance on nuclear fire systems began to expose the limitations of the concepts versatility over time. Remembering that the birth of the concept was in response to demonstrate the Army's role in the Massive Retaliation Strategy of the United States meant that the concept was born as much of political and

social factors as it was threat based factors. As America's strategy shifted to one of Flexible Response the utility of the concept diminished.¹¹⁸ With the reliance upon nuclear strikes the requirement for the enemy to mass or concentrate became a precursor to the use of these weapons. If the enemy did not mass the Division did not possess the conventional weapons capability to stop a dispersed enemy. Over time, the concepts idea of nonlinear operations became one of a linear line of defense to stop an enemy that did not mass.¹¹⁹

The Island concept was also self-defeating. If an enemy did mass it would be in response to having identified a lucrative target. Often this would be in the areas between BGs and usually in close proximity to a particular BG. The use of nuclear fires to defeat the enemy could have the consequences of also destroying the BG that was being massed against. Thus the concept had a fundamental flaw in its employment.¹²⁰

As a result the Pentomic concept could only work in a totally nuclear conflict, albeit with extreme risk of fratricide, and not across the full spectrum of conflict. Numerous studies of the 1950s demonstrated this fact. The concept was not flexible or adaptable enough to meet all the diverse requirements of conflict. It could not accomplish a variety of missions.¹²¹ While the goal of the concept was not to have an organization that relied too heavily on nuclear weapons and to have a dual capability of nuclear/conventional use, that is what it evolved into. This was aided by the Army's fixation on nuclear weapons and not on more mundane conventional items such as trucks, rifles or people.¹²²

Another factor that inhibited the concepts versatility was that it was viewed as only a temporary fix to the changes brought on by nuclear weapons to the battlefield. The concept was originally planned as a five-year probationary program of development that would integrate nuclear technologies into the Army division. Thus the concept was born as an inflexible response to the varieties of the battlefield.¹²³ It is easy to see that the seeds of failure of the concept in the area of versatility were sown upfront at the concepts inception.

While the Pentomic Division structure never participated in combat its lack of versatility was demonstrated during an actual crises. As part of OPERATION BLUEBAT, which dealt with the Lebanese crises of 1958, Pentomic Divisional units were being deployed from Europe to conduct the operation. During the deployment there was much confusion over the deployment of the Honest John nuclear rocket batteries. USAREUR wanted deployment of these weapons systems while the Commander of the Specified Command, Admiral John Holloway, did not want them. After many delays, due in part to the ongoing debate that included the Joint Chiefs of Staff (JCS), the batteries were deployed. As the batteries arrived in Lebanon the JCS reversed an earlier decision to deploy them. Immediately the batteries were shipped back to Europe.¹²⁴

The result of the lack of versatility meant that the Pentomic Division had to undergo significant reorganization to conduct any missions other than nuclear war.¹²⁵ With its use restricted to total nuclear war, the concept was doomed to demise in the long run. After its five-year probationary period the concept was scrapped and the Army reorganized its divisions again.

The AAN BF concept at first appears to have limited utility in its employment as well. Its organic combat systems that are lighter than traditional heavier forces gives it this initial impression. However, this is one of the primary objectives of the concept. The AAN BF concept is a conscious attempt to narrow the gap between heavy and light forces. It attempts to retain the positive qualities of both force structures.¹²⁶ It is not intended to go into a long duration tank on tank fight but to strike asymmetrically against an enemy. This is evident in its approach to battle rhythm, attacking of decisive points and operations in depth. The use of joint forces facilitates this concept. It is not an attempt to be everything to everybody.

There are many scenarios that one could envision the use of the AAN BF that would demonstrate its versatility. One would be its primary role of a quick decisive operation that takes down an enemy systematically. The use in OOTWs is easily apparent also. Due to its organic worldwide mobility, the AAN BF could deploy in the initial stages of an OOTW in order to provide security in a theater. Conventional forces could then deploy under the ANN BF's security and relieve the BF after it is established in theater. This type of operation could include the seizure of key air and seaports of debarkation for the conventional forces use. In emergency relief type operations, where security is not an issue, the AAN BF airframes could be utilized to transport relief supplies and food to the impoverished area. In these scenarios the Army's reaction time will be reduced significantly.

The AAN BF can also conduct an effective visible show of force of deterrence to a potential threat like a naval Carrier Battle Group, Marine Corps MEF or Air Force aircraft. The AAN BF could quickly deploy to a nearby area next to the threat as a

demonstration of U.S. resolve and will to deal with a crises situation. In this way the concept helps shape the peace.¹²⁸

In more traditional forms of conventional combat the AAN BF could be utilized much like today's long range artillery, Army aviation or Air Force aviation to strike at decisive points deep in an enemies rear area in support of the conventional forces. These could be key C2 or logistics locations or merely to interrupt a critical LOC for a period of time to insure success in the main battle area.

The AAN BF can quickly and effectively task organize itself to meet any contingency. It is designed in a modular structure throughout its organizations to deploy only what is necessary to conduct an operation. Additionally, only one, two or three Battle Elements could be used of the six that are available in the BF structure. This will give the AAN BF commander many deployment options to meet any contingency.

The versatility of the AAN BF is greater than that which was possessed by the Pentomic concept. It will give the United States more options with ground forces than ever before. This is made possible by its organic mobility, quick reaction time, strategic reach and conventional precision firepower. The AAN BF will be a versatile force in the year 2025.

SUMMARY OF FINDINGS

The AAN BF concept supports the five basic Tenets of Army Operations as outlined in FM 100-5 better than the Pentomic concept did. The AAN BF concept consistently achieves the tenets of initiative, agility, depth, synchronization and versatility. Conversely, the Pentomic concept had significant shortfalls in these areas

that were exposed over its five-year life. While the AAN BF concept is still in its exploration phase there will still be time for the Army to come closer to the mark on the five tenets. The twenty-five year time span to make corrections and refinements to the concept before significant changes are made to organizations or major procurement programs are embarked upon for new equipment is a key advantage of this concept. The Pentomic concept did not have this luxury.

One of the principle reasons why the Pentomic concept failed was its imbalance between strategy, state of technology and the ambitions of doctrine. Put simply, the state of technology of the mid to late 1950s did not support the doctrinal developments required of the nuclear battlefield. Additionally, the Army was not prepared mentally to deal with this new theoretical form of war which it had no previous experience in. The Pentomic doctrine did not have a true appreciation of the technical demands of nuclear warfare.¹²⁸ Thus the reliance on low level release authority of tactical nuclear weapons became a fundamental flaw of the concept. These reasons were exacerbated by not developing the people or equipment required for the concept.

The AAN BF concept designers/integrators must insure that these gaps do not occur in the future of this concept. Honest reviews and azimuth checks should be constantly done to the AAN BF concept to insure its viability in the year 2025. Lastly, the concept will have to be resourced according to its design criteria in order for it to work.

PRINCIPLE CONCLUSIONS

There are three basic reasons why the AAN BF concept is different in comparison to the Pentomic concept. These reasons are the time span of development

of the concepts, the political and social environments under which these concepts derived from and the implementation of the concept design. These differences demonstrate that the AAN BF concept is another Pentomic concept with additional technology.

The time span of development of these concepts is a critical factor. The Pentomic concept went from 1956 to 1960. The AAN BF concept will reach fruition in the year 2025. Essentially the AAN BF concept will have twenty more years of development and refinement. The Pentomic concept was a quick fix to nuclear weapons on the battlefield and pushed onto the field Army. The AAN BF concept is a more deliberate approach to future warfare. As a result the AAN BF concept will be subjected to many more experiments, tests and reviews than the Pentomic concept. This process should give the Army a better thought out approach and applicable concept in the year 2025. Assisting this developmental process will be the MSF concept development in the near term. Its employment and development in mobility should be utilized by the AAN BF concept development. This test bed of information was an advantage the Pentomic concept did not enjoy.

Due to its quick rush to the field the Pentomic concept had to rely upon the development of new technologies to make it work. The AAN BF concept attempts to exploit new and emerging technologies to make it work. In other words, it is concept driven by what technology will allow it to do as opposed to the Pentomic concepts driving of technology. The twenty-five year time span of development of the AAN BF concept will allow for a greater development of technology than the five-year span of the Pentomic concept.

The political and social environment under which both concepts were initially developed is another key difference, which favors the AAN BF concept. The Pentomic concept was developed to demonstrate the Army's role in a nuclear warfare environment in order to receive adequate funding. With the diminishing resources to the defense establishment in the country there was great rivalry between services not only in funding but also on roles on the nuclear battlefield. Thus there was little or no ability to achieve any degree of Jointness in the concept. This resulted in the Pentomic concept being an "Army only" concept with no integration of its sister services. In fact, there was little or no integration of the reserve component in the concept.

The AAN BF concept faces a significantly different environment. The current environment of cooperation between services facilitates the AAN BF concept. The services recognize that military operations in the future will be joint by nature and that single service operations will be extremely rare. The AAN BF concept capitalizes upon this environment by integrating Joint fires and collection assets to achieved massed effects to overwhelm an enemy. Unlike the Pentomic concept this is not an Army only concept but has significant portions allocated to its sister services. This will facilitate the development and cooperation by involving the services in this concept as all of them will have a stake in its future. Additionally, by its Joint nature it will likely have a better opportunity for funding from Congress.

The last of the differences between the two concepts is that of the implementation of the concept design. The Pentomic concept became too dependent on one weapons system, nuclear fires. This fixation and over reliance upon nuclear weapons was a significant reason for its downfall. The AAN BF concept does not rely

on a single system to make it work. It attempts to integrate multiple systems to achieve effects. This reliance upon multiple systems will give it a more redundant quality that, in the event one system fails or is not applicable to a particular situation, the concept can still retain its utility as a whole. It is more of a systematic approach to warfare than the Pentomic concept.

The Pentomic concept depended upon destruction by fires and a single narrow penetration by a limited number of forces. The AAN BF concept relies more on mobility by great numbers of forces across the depth of the battlefield in order to place the enemy in an untenable position. This ability to move forces over great distances while still retaining significant firepower gives the AAN BF concept more utility than the Pentomic concept. The Pentomic concept never truly possessed the mobility to fully exploit an advantage. Additionally, the Pentomic BGs were never allowed to rotate in and out of battle to retain combat effectiveness. The AAN BF's battle rhythm allows this so not only are the BFs maintained at a high rate of effectiveness but they also put continual pressure on an opposing force.

Lastly, the AAN BFs do not rely heavily upon higher echelons for mobility or fire support like the Pentomic BGs. They also possess a robust logistics capability though due to the anticipated battle rhythm the amount of logistics operations forward on the battlefield will be kept to a minimum. The Pentomic BGs were too reliant upon the Division to effectively conduct nonlinear independent actions like the AAN BFs will conduct in the future.

The three differences in time span, political/social environment and implementation of design give the AAN BF concept a decided advantage over the

Pentomic concept. They will allow the AAN BF concept to better achieve the five tenets.

RECOMMENDATIONS

In order for the Army to avoid the mistakes of the Pentomic concept it should do a minimum of three things.

First, the Army needs to recognize the problems and trends of past force redesign efforts. One of these trends is that redesign efforts that overly focused on reducing manpower have usually failed. Another is that efforts that relied heavily on new or emerging technologies have repeatedly failed. Lastly, the synchronization of technology and force redesign is difficult at best and requires extremely detailed planning and implementation.¹²⁹ An understanding of these historical shortfalls will give the AAN BF concept a higher probability of success in the future. It will also give the Army an opportunity to develop mechanisms to identify these problems as they occur and strategies to deal with them.

Second, the Army needs to conduct continual reviews of the concept in order to insure the concept remains both viable and credible in the year 2025. One of the dangers the Army runs is that the concept and force redesign may begin to outdistance the pace of technological developments that support it.¹³⁰ By conducting continuous checks this problem can be avoided. Due to the expected large resources required to develop this concept, in both people and money, the Army does not want to realize in the year 2020 that the concept is useless. The AAN BF concept needs to be adaptive to change and continually modified to meet not only new challenges but also constraints in order for it to remain credible.

Lastly, the Army needs to insure that strong leadership is involved for the development of the AAN BF concept. This has historically been the critical factor in force redesign.¹³¹ Undoubtedly, there will be difficult decisions required in the future development of the AAN BF concept. Sound and logical decision making will be required. Additionally, leadership will need to be non-parochial and not become too one-sided in its thinking regarding the concept.

As the Army moves ahead with the development of the AAN BF concept it should be mindful of the mistakes of the past efforts in force redesign. The Pentomic concept is a good example from which to draw lessons of how not to develop a new concept. With so much at risk, in both people and national treasure as well as prestige, the Army must take every precaution to insure that the AAN BF concept does not repeat the mistakes of the past.

ENDNOTES

1. Wilson, John B., Influences On U.S. Army Divisional Organization In The Twentieth Century, United States Army Lessons Learned, Ft. Leavenworth, Kansas, 1995, p. 4.
2. Terpeluk, William, Lessons From The Past And A Vision Of The Future: Tactical Headquarters Requirements In Force XXI, Strategic Research Project, United States Army War College, Carlisle Barracks, Pennsylvania, 18 April 1995, p. 6.
3. Weigly, Russel F., History of the United States Army, MacMillan, New York, New York, 1967, p. 536.
4. LeGare, J. Marc, "Paradigm Found – The Nuclear and Nonlinear Battlefields", School of Advanced Military Studies, United States Army Command and General Staff College, Ft. Leavenworth, Kansas, 4 February 1993, p. 6.
5. Cushman, John H., "Pentomic Infantry Division in Combat", Military Review, Vol. 37 (January 1958), p. 29.
6. LeGare, Ibid., p. 12.
7. Ibid., p. 8.
8. Ibid., p. 8.
9. Ney, Virgil, Evolution Of The U.S. Army Division 1939 – 1968, Combat Operation Group, United States Army Combat Developments Command, Ft. Belvoir, Virginia, January 1969, p. 109.
10. Bacevich, A.J., The Pentomic Era: The U.S. Army Between Korea and Vietnam, National Defense University Press, Washington D.C., 1986, p. 68.
11. Deputy Chief of Staff for Doctrine, An AAN Primer For AOSF: Future Operational Art Considerations, Crises Response and Potential Force Capabilities, Futures Directorate, United States Army Training and Doctrine Command, Ft. Monroe, Virginia, 14 December 1998, Slide 63.
12. Ibid., p. 63.
13. Command Arms Support Command, Army After Next: Concept of Support for AAN Battle Force, United States Army Training and Doctrine Command, Ft. Lee, Virginia, 29 November 1997, p. 6.
14. Deputy Chief of Staff for Doctrine, Ibid., Slide 66.

15. Ibid., Slide 58.
16. Ibid., Slide 58.
17. Ibid., Slide 6.
18. Ibid., Slide 54.
19. Combined Arms Support Command, Ibid., p. 7.
20. Bacevich, Ibid., p. 53.
21. Field Manual 100-5, Operations, Headquarters, Department of the Army, Washington D.C., 14 June 1993, p. 2-6.
22. Ibid., p. 2-6.
23. Ibid., p. 2-6.
24. Ibid., p. 2-7.
25. Ibid., p. 2-7.
26. Ibid., p. 2-8.
27. Ibid., p. 2-9.
28. Ney, Ibid., p. 73.
29. Mataxis, Theodore C., and Seymour L. Goldberg, Nuclear Tactics, Weapons, and Firepower in the Pentomic Division, Battle Group, and Company, Military Service Publishing Company, Harrisburg, Pennsylvania, 1958, p. 212.
30. Hungate, James W., "Tactics – Defense, Pentomic Infantry Division", Infantry, Vol 47 (October 1957), p. 10.
31. Reinhardt G.C., and W.R. Kitner, Atomic Weapons in Land Combat, Military Service Publishing Company, Harrisburg, Pennsylvania, 1954, p. 201.
32. Evans, Michael, The Primacy of Doctrine: The United States Army and Military Innovation and Reform, 1945 – 1995, Army Occasional Paper Number 1, Directorate of Army Research and Analysis, Washington D.C., August 1996, p. 5.
33. Bacevich, Ibid., p. 104.
34. Ibid., p. 108.

35. Ibid., p. 109.
36. Ney, Ibid., p. 109.
37. Smith, Jack F., "Pentomic Doctrine: A Model For Future War", School of Advanced Military Studies, Command and General Staff College, Ft. Leavenworth, Kansas, 6 May 1994, p. 18.
38. Ney, Ibid., p. 109.
39. Hawkins, Glen R., and James Jay Carafano, Prelude To Army XXI: U.S. Army Division Design Initiatives and Experiments 1917 – 1995, United States Army Center of Military History, Washington D.C., 1997, p. 7.
40. Mataxis and Goldberg, Ibid., p. 107.
41. Orlov II, Morton, "Organizing For War: Past and Present", School of Advanced Military Studies, United States Army Command and General Staff College, Ft. Leavenworth, Kansas, 6 May 1994, p. 20.
42. Carey, Mark G., "Forging Apollo's Golden Bow: Long Range Precision Fires in Future High Intensity Combat", School of Advanced Military Studies, United States Army Command and General Staff College, Ft. Leavenworth, Kansas, 4 December 1996, p. 16.
43. Evans, Ibid., p. 5.
44. Bacevich, Ibid., p. 112.
45. Hawkins and Carafano, Ibid., p. 9.
46. Cushman, Ibid., p. 26.
47. Terpeluk, Ibid., p. 11.
48. Tosh, Vernie G., and James B. Hudson, "Mobility Pentomic Division", Infantry, Vol 47 (July 1957), p. 38.
49. Hovell. Bergen B., "Armored Infantry is Different", Army, Vol 9 (November 1958), p. 50.
50. Deputy Chief of Staff for Doctrine, Ibid., slide 58.
51. Ibid., slide 60.
52. Ibid., slide 59.

53. Ibid., slide 63.
54. Mowery, Lawrence L. and James B. Hobson, "Air Mobility", Infantry, Vol 47 (July 1957), p. 40.
55. Military Art Workshop, Fire Support Systems AAN 98, United States Army Training and Doctrine Command, Ft. Monroe, 30 September 1997, Slide 3.
56. Deputy Chief of Staff for Doctrine, Ibid., slide 66.
57. Reinhardt and Kintner, Ibid., p. 207.
58. Smith, Ibid., p. 19.
59. Mataxis and Goldberg, Ibid., p. 240.
60. Bacevich, Ibid., p. 73.
61. Worley, Marvin L., A Digest Of New Developments In Army Weapons, Tactics, Organizations And Equipment, Stackpole Company, Harrisburg, Pennsylvania, 1959, p. 371.
62. Ney, Ibid., p. 109.
63. LeGare, Ibid., p. 10.
64. Pullman, Milton A., "Administration In The Pentomic Infantry Division", Military Review, Vol 37 (January 1958), p. 34.
65. Mowery and Hobson, Ibid., p. 44.
66. Hawkins and Carafano, Ibid., p. 8.
67. Bacevich, Ibid., p. 100.
68. Mataxis and Goldberg, Ibid., p. 212.
69. Bacevich, Ibid., p. 100.
70. Tosh and Hudson, Ibid., p. 36.
71. Wilson, John B., Influences On U.S. Army Divisional Organization In The Twentieth Century, United States Army Center for Army Lessons Learned, Ft. Leavenworth, Kansas, December 1995, p. 5.
72. Bacevich, Ibid., p. 100.

73. Mataxis and Goldberg, Ibid., p. 104.
74. Ibid., p. 211.
75. Bacevich, Ibid., p. 68.
76. Smith, Ibid., p. 22.
77. Deputy Chief of Staff for Doctrine, Ibid., slide 5.
78. Fukuyama, Francis and Abram N. Shulsky, The "Virtual Corporation" and Army Organization, Army Research Division, Rand Arroyo Center, Santa Monica, California, 1997. P. 1.
79. Combined Arms Support Command, Ibid., p. 16.
80. Gavin, James M., "Calvary, And I Don't Mean Horses", Combat Forces Journal, June 1954, p. 27.
81. Terpeluk, Ibid., p. 2.
82. Bacevich, Ibid., p. 117.
83. LeGare, Ibid., p. 9.
84. Ney, Ibid., p. 109.
85. Worley, Ibid., p. 275.
86. Carey, Ibid., p. 16.
87. Wilson, Ibid., p. 5.
88. Hawkins and Carafano, Ibid., p. 9.
89. Young, Robert M., "Artillery of the Pentomic Infantry Division", Military Review, Vol 38 (April 1958), p. 41.
90. Bacevich, Ibid., p. 88.
91. Ibid., p. 73.
92. Reinhardt and Kintner, Ibid., p. 207.
93. Mataxis and Goldberg, Ibid., p. 242.

94. Bacevich, Ibid., p. 118.
95. Smith, Ibid., p. 33.
96. Deputy Chief of Staff for Doctrine, Ibid., slide 64.
97. Ibid., slide 55.
98. Combined Arms Support Command, Ibid., p. 20.
99. Gavin, Ibid., p. 27.
100. Perret-Gentil, J., "Divisions – Three or Five Elements?", Military Review, Vol 41 (February 1961), p. 23.
101. Fisher, Earnest F., Relationship of the ROAD Concept to Moral Considerations in Strategic Planning, History Division, Office of the Chief of Military History, Department of the Army, United States Army War College, Carlisle Barracks, Pennsylvania, 1964, p. 58.
102. Pascoe, Michael C., Future Force Design: Are We Interested in Protecting Rice Bowls or Winning the Next Super Bowl?, Individual Studies Project, United States Army War College, Carlisle Barracks, Pennsylvania, 15 April 1992, p. 8.
103. Terpeluk, Ibid., p. 3.
104. Pullman, Ibid., p. 39.
105. Reinhardt and Kintner, Ibid., p. 61.
106. Terpeluk, Ibid., p. 18.
107. Ibid., p. 13.
108. Ney, Ibid., p. 73.
109. Terpeluk, Ibid., p. 13.
110. Bacevich, Ibid., p. 113.
111. Wilson, Ibid., p. 6.
112. Fukuyama and Shulsky, Ibid., p. 1.
113. Deputy Chief of Staff for Doctrine, Ibid., slide 63.

- 114. Ibid., slide 73.
- 115. Combined Arms Support Command, Ibid., p. 2.
- 116. LeGare, Ibid., p. 6.
- 117. Orlov II, Ibid., p. 16.
- 118. Ney, Ibid., p. 74.
- 119. Hungate, Ibid., p. 10.
- 120. Bacevich, Ibid., p. 118.
- 121. Weigley, Ibid., p. 540.
- 122. Wilson, Ibid., p. 5.
- 123. Fisher, Ibid., p. 53.
- 124. Orlov II, Ibid., p. 20.
- 125. Ney, Ibid., p. 74.
- 126. Deputy Chief of Staff for Doctrine, Ibid., slide 5.
- 127. Ibid., slide 40.
- 128. Evans, Ibid., p. 5.
- 129. Hawkins and Carafano, Ibid., p. 4.
- 130. Terpeluk, Ibid., p. 26.
- 131. Hawkins and Carafano, Ibid., p. 5.

BIBLIOGRAPHY

BOOKS

Bacevich, A.J., The Pentomic Era: The U.S. Army Between Korea and Vietnam, National Defense University Press, Washington D.C., 1986.

Mataxis, Theodore C., and Seymour L. Goldberg, Nuclear Tactics, Weapons, and Firepower in the Pentomic Division, Battle Group, and Company, Military Service Publishing Company, Harrisburg, Pennsylvania, 1958.

Reinhardt, G.C., and W.R. Kintner, Atomic Weapons in Land Combat, Military Service Publishing Company, Harrisburg, Pennsylvania, 1954.

Weigley, Russell F., History of the United States Army, MacMillan Books, New York, New York, 1967.

Worley, Marvin L., A Digest Of New Developments In Army Weapons, Tactics, Organization And Equipment, Stackpole Company, Harrisburg, Pennsylvania, 1959.

MILITARY MANUALS, PUBLICATIONS, AND GOVERNMENT DOCUMENTS

Combined Arms Support Command, Army After Next: Concept of Support for AAN Battle Force, United States Army Training and Doctrine Command, Ft. Lee, Virginia, 29 November 1997.

Deputy Chief of Staff for Doctrine, An AAN Primer for AOSF: Future Operational Art Considerations, Crises Response and Potential Force Capabilities, Futures Directorate, United States Army Training and Doctrine Command, Ft. Monroe, Virginia, 14 December 1998.

Evans, Michael, The Primacy of Doctrine: The United States Army and Military Innovation and Reform, 1945 – 1995, Army Occasional Paper Number 1, Directorate of Army Research and Analysis, Washington D.C., August 1996.

Department of the Army, FM 100-5 Operations, Headquarters, Department of the Army, Washington D.C., 14 June 1993.

Fisher, Earnest F., Relationship of the ROAD Concept to Moral Considerations in Strategic Planning, History Division, Office of the Chief of Military History, Department of the Army, United States Army War College, Carlisle Barracks, Pennsylvania, 1964.

Hawkins, Glen R., and James Jay Carafano, Prelude to Army XXI: U.S. Army Division Design Initiatives and Experiments 1917 – 1995, United States Army Center of Military History, Washington D.C., 1997.

Military Art Workshop, Fire Support Systems AAN 98, United States Army Training and Doctrine Command, Ft. Monroe, Virginia, 30 September 1997.

Ney, Virgil, Evolution of the U.S. Army Division 1939 – 1968, Combat Operations Research Group, United States Army Combat Developments Command, Ft. Belvoir, Virginia, January 1969.

Wilson, John B., Influences On U.S. Army Divisional Organization In The Twentieth Century, United States Army Center for Army Lessons Learned, Ft. Leavenworth, Kansas, December 1995.

STUDIES

Fukuyama, Francis and Abram N. Shulsky, The “Virtual” Corporation and Army Organization, Army Research Division, Rand Arroyo Center, Santa Monica, California, 1997.

Pascoe, Michael G., Future Force Design: Are We Interested in Protecting Rice Bowls or Winning the Next Super Bowl?, Individual Studies Project, United States Army War College, Carlisle Barracks, Pennsylvania, 15 April 1992.

Terpeluk, William, Lessons From The Past And A Vision Of The Future: Tactical Headquarters Requirements In Force XXI, Strategic Research Project, United States Army War College, Carlisle Barracks, Pennsylvania, 18 April 1995.

MONOGRAPHS

Carey, Mark G., “Forging Apollo’s Golden Bow: Long Range Precision Fires in Future High Intensity Combat”, School of Advanced Military Studies, United States Army Command and General Staff College, Ft. Leavenworth, Kansas, 4 December 1996.

LeGare, J. Marc, “Paradigm Found – The Nuclear and Nonlinear Battlefields”, School of Advanced Military Studies, United States Army Command and General Staff College, Ft. Leavenworth, Kansas, 4 February 1993.

Orlov II, Morton, “Organizing For War: Past and Present”, School of Advanced Military Studies, United States Army Command and General Staff College, Ft. Leavenworth, Kansas, 6 May 1994.

Smith, Jack F., “Pentomic Doctrine: A Model For Future War”, School of Advanced Military Studies, United States Army Command and General Staff College, Ft. Leavenworth, Kansas, 6 May 1994.

ARTICLES AND PERIODICALS

Cushman, John H., "Pentomic Infantry Division in Combat", Military Review, Vol 37 (January 1958), pp. 19-30.

Gavin, James M., "Calvary, And I Don't Mean Horses", Combat Forces Journal, (June 1954), pp. 22-27.

Hovell, Bergen B., "Armored Infantry is Different", Army, Vol 9 (November 1958), pp. 49-53.

Hungate, James W., "Tactics – Defense, Pentomic Infantry Division", Infantry, Vol 47 (October 1957), pp. 9-11.

Mowery, Lawrence L., and James B. Hobson, "Air Mobility", Infantry, Vol 47 (July 1957), pp. 39-44.

Perret-Gentil, J., "Divisions – Three or Five Elements?", Military Review, Vol 41 (February 1961), pp. 16-25.

Pullman, Milton A., "Administration in the Pentomic Infantry Division", Military Review, Vol 37 (January 1958), pp. 31-39.

Tosh, Vernie G., and James B. Hudson, "Mobility Pentomic Infantry Division", Infantry, Vol 47 (July 1957), pp. 35-39.

Young, Robert M., "Artillery of the Pentomic Infantry Division", Military Review, Vol 38 (April 1958), pp. 32-42.